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SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, Kaigo Tanaka, a citizen of Japan residing at Kawasaki, Japan and Sonomasa Kobayashi, a citizen of Japan residing at Kawasaki, Japan have invented certain new and useful improvements in

A BATTERY PACK FOR AN INFORMATION PROCESSING  
APPARATUS AND THE INFORMATION PROCESSING APPARATUS

of which the following is a specification : -

TITLE OF THE INVENTION

A BATTERY PACK FOR AN INFORMATION  
PROCESSING APPARATUS AND THE INFORMATION PROCESSING  
APPARATUS

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to  
battery packs for information processing apparatuses  
10 and the information processing apparatuses, and more  
particularly, to a high capacity battery pack for a  
portable personal computer and the portable personal  
computer to which the pack is detachably connected.

2. Description of the Related Art

15 A portable personal computer has a battery  
pack connecting part by which a battery pack is  
connected to the portable personal computer,  
situated at a front end side face part of the body  
part and having a concave shape. A battery pack is  
20 connected to the battery pack connecting part, so  
that the battery pack is placed in an external form  
of the portable personal computer. A battery  
arranged in the battery pack is used as an electric  
power source to operate the portable personal  
25 computer.

As an option of the battery pack, a high  
capacity battery pack for a high capacity battery  
having a higher capacity than a normal battery can  
be used. Since the high capacity battery pack has a  
30 bigger size than a normal battery pack, an overhang  
part is formed in a state where the high capacity  
battery pack is connected to the battery pack  
connecting part of the body part. The overhang part  
overhangs from a body part side to a front side.

35 FIG. 1 is a perspective view of a related  
art a high capacity battery pack 10 and a battery  
pack connecting part 22 of a portable personal

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computer 20. FIG. 2 is a sectional view of the portable personal computer 20 to which the high capacity battery pack 10 shown in FIG. 1 is connected. Referring to FIGS. 1 and 2, the high capacity battery pack 10 is clamped to the battery pack connecting part 22 situated at a front end side face part of a body part 21 of the portable personal computer 20. The high capacity battery pack 10 has an upper surface 11 which is a plane. When the high capacity battery pack 10 is connected to the portable personal computer 20, a overhang part 12 overhangs from a front end side wall part 23 to a front side, namely a Y2 side. A liquid crystal display part 25 is capable of being opened and closed against the body part 21. An operator hangs and pulls up a front end part 26 of the liquid crystal display part 25 with a fingertip part 30 in order to open the liquid crystal display part 25 and use the portable personal computer 20.

However, the overhang part 12 of the high capacity battery pack 10, overhanging from the front end side wall 23 to the front side, namely the Y2 side, is a obstacle to hanging the front end part 26 of the liquid crystal display part 25 with the fingertip part 30 of the operator.

Hence, it is hard for the operator to operate to open the liquid crystal display part 25 of the related art portable personal computer 20, and a nail of the fingertip 30 of the operator may be harmed.

#### SUMMARY OF THE INVENTION

Accordingly, it is a general object of the present invention to provide a novel and useful battery pack for an information processing apparatus and the information processing apparatus, in which one or more of the problems described above are

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eliminated.

Another and more specific object of the present invention is to provide a battery pack for an information processing apparatus having a display part and the information processing apparatus, wherein the battery pack has a hollow part by which a fingertip part of an operator is accepted, so that the fingertip part is hang on an front end part of the display part of the information processing apparatus easily to open the display part.

The above objects of the present invention are achieved by a battery pack detachably connected to an information processing apparatus, wherein the information processing apparatus includes a body part and a display part supported by the body part and thereby the display part can be opened and closed against the body part, including a housing part having a hollow part in which a battery can be housed, wherein the hollow part is situated at a position which faces an end part of the display part when the display part is closed. The above objects of the present invention are also achieved by an information processing apparatus, including a body part in which an information processing part for processing information is arranged, a display part supported by the body part and thereby the display part can be opened and closed against the body part, and a battery pack which is detachably connected to the information processing apparatus and includes a housing part having a hollow part in which a battery can be housed, wherein the hollow part is situated at a position which faces an end part of the display part when the display part is closed.

According to the present invention described above, when an operator hangs and pulls up the front end part of the display part with a fingertip part of the operator in order to open the

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display part and use the information processing apparatus, it is not necessary to force to enter the fingertip part into a position between the front end part of the display part and the battery pack. That  
5 is, when the operator puts the fingertip at the front end part of the closed display part, the fingertip part is accepted by the hollow part. As a result, the front end part of the display part is easy to be hung by the fingertip part. Therefore,  
10 it is possible for the operator to open the display part smoothly and prevent a nail of the fingertip part from being harmed.

The hollow part may have a full length of the housing part in a width direction.

15 According to the present invention as described above, when the operator puts the fingertip on any position at the front end part of the closed display part in the width direction in order to attempt to open the display part, the  
20 fingertip part enters into the hollow part. That is, the front end part of the display part is easily hung with the fingertip part by reaching out the fingertip part to a convenient position to operate at the front end part of the display part, without  
25 seeking a position of the hollow part consciously. Hence, an operator can open the display part easily and accurately.

The housing part may include a first battery line housing part and a second battery line  
30 housing part in which batteries having column configurations can be respectively are housed, the first battery line housing part and the second battery line housing part are situated parallelly in a width direction of the housing part, the housing  
35 part has a configuration fitting configurations of the batteries, and the hollow part is situated at a position between the first battery line housing part

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and the second battery line housing part.

According to the present invention as described above, it is possible to form the hollow part on the housing of the battery pack reasonably, without making the battery line housing parts of the housing in the battery pack narrow.

Other objects, features, and advantages of the present invention will be come more apparent from the following detailed description when read in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a related art high capacity battery pack and a battery pack connecting part of a portable personal computer;

FIG. 2 is a sectional view of the portable personal computer to which the battery pack shown in FIG. 1 is connected;

FIG. 3 is a perspective view of a correspondence of a high capacity battery pack and an information processing apparatus to which the high capacity battery pack is connected, according to an embodiment of the present invention;

FIG. 4 is a perspective view for the information processing apparatus to which the high capacity battery pack is connected, according to an embodiment of the present invention;

FIG. 5 is a perspective view of a high capacity battery pack according to the embodiment of the present invention;

FIG. 6 is a sectional view of the high capacity battery pack shown in FIG. 5; and

FIG. 7 is a view for explaining an operation to open a liquid crystal display part of the portable personal computer to which the high capacity battery pack 40 connected, according to an embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description will now be given, with reference to the drawings of FIGS. 3 through 7, of embodiments of the present invention.

5           FIG. 3 is a perspective view of a correspondence of a high capacity battery pack and an information processing apparatus to which the high capacity battery pack is connected, according to an embodiment of the present invention. FIG. 4  
10 is a perspective view for the information processing apparatus to which the high capacity battery pack is connected, according to the embodiment of the present invention.

Referring to FIGS. 3 and 4, a high  
15 capacity battery pack 40 is connected a portable personal computer 60.

The portable personal computer 60 includes a body part 61 and a liquid crystal display part 64, as shown in FIGS. 3 and 4. The liquid crystal  
20 display part 64 is rotatably supported against the body part 61 by a supporting part 63 situated at a rear end part of the body part 61, so that the liquid crystal display part 64 can be opened and closed. When the liquid crystal display part 64  
25 falls forward on the body part 61 and is closed, a liquid crystal display surface 65 cannot be seen by the operator. When the liquid crystal display part 64 is raised and opened, the liquid crystal display surface 65 is exposed to the operator. An  
30 information processing part such as an CPU not shown in FIGS. 3 and 4 is arranged inside of the body part 61. A key-board part 66 is arranged on an upper surface of the body part 61. A battery pack  
35 connecting part 67 for connecting a standard battery pack 80 or a high capacity battery pack 40 to the portable personal computer 60 is situated at a front end side face part of the body part 61. The battery

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pack connecting part 67 has a concave shape part against a front end side surface 68 of the body part 61. The concave shape part of the battery pack connecting part 67 has a same size as a size of the standard battery pack 80. The standard battery pack 80 is tightly connected to the battery pack connecting part 67 by a concave part 69.

A length from the supporting part 63 to a front end part 70 of the liquid crystal display part 64 is same as a length from the supporting part 63 to the front end side surface 68 of the body part 61.

Next, the high capacity battery pack 40 will be described with reference to FIGS. 5 and 6.

FIG. 5 is a perspective view of the high capacity battery pack 40 according to the embodiment of the present invention. FIG. 6 is a sectional view of the high capacity battery pack 40 shown in FIG. 5.

Referring to FIGS. 5 and 6, the high capacity battery pack 40 has a housing part 41. Batteries 42 and 43 having column shapes respectively are built in the housing 41 in a Y1-Y2 direction parallelly. For example, three of the batteries 42 and three of the batteries 43 are built in the housing 41 parallelly. A connector 44 is provided in the center of a surface of a Y1 side of the housing 41. The high capacity battery pack 40 also has an upper surface 45 and a lower surface 46.

A first battery line 47 is comprised of the plural battery 42 which form a line in an X1-X2 direction. A second battery line 48 is situated at a position adjoining a Y2 side of the first battery line 47. The second battery line 48 is comprised of the plural battery 43 which form a line in the X1-X2 direction. A first battery line housing part 49 where the first battery line 47 is housed and a second battery line housing part 50 where the second

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battery line 48 is housed are arranged in the housing 41. The first battery line housing part 49 adjoins the second battery line housing part 50 in the Y1-Y2 direction. The high capacity battery pack 40 has a bigger size than the standard battery pack 80 by the second battery line housing part 50. Since both ends of the X1-X2 direction of the second battery line housing part 50 overhangs from surfaces where the both ends of the first battery line housing part 49 are situated, the second battery line housing part 50 has a longer length in the X1-X2 direction than the first battery line housing part 49.

The housing 41 has a configuration fitting a configuration of the batteries. The first battery line housing part 49 has a configuration of a part of a cylinder. The second battery line housing part 50 has a substantially cylindrical configuration. The upper surface 45 of the housing 41 has a hollow part 51 having a full length of the housing 41 in the X1-X2 direction. The hollow part 51 is arranged between the first battery line housing part 49 and the second battery line housing part 50, on the upper surface 45 of the housing 41. The lower surface 46 of the housing has a hollow part 52 having a full length of the housing 41 in the X1-X2 direction. The hollow part 52 is arranged between the first battery line housing part 49 and the second battery line housing part 50, on the lower surface 46 of the housing 41.

As shown in FIG. 3 or FIG. 4, the high capacity battery pack 40 is detachably connected to the battery pack connecting part 67. The first battery line housing part 49 is connected to the battery pack connecting part 67 by the concave part 69. The second battery line housing part 50 overhangs from the front end side surface 68 of the

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body part 61 in the Y2 direction. The second battery line housing part 50 also overhangs from the front end part 70 of the liquid crystal display part 64 in the Y2 direction when the liquid crystal display part 64 is closed.

FIG. 7 is a view for explaining an operation to open the liquid crystal display part 64 of the portable personal computer 60 to which the high capacity battery pack 40 is connected, according to the embodiment of the present invention.

Referring to FIG. 7, when the liquid crystal display part 64 is closed, the hollow part 51 faces the front end part 70 of the liquid crystal display part 64. Accordingly, when the operator hangs and pulls up the front end part 70 of the liquid crystal display part 64 with the fingertip part 30 in order to use the portable personal computer 60, the fingertip part 30 enters to the hollow part 51. As a result, the front end part 70 of the liquid crystal display part 64 is easy to be hung with the fingertip part 30, as shown in FIG. 7. Therefore, it is possible to open the liquid crystal display part 64 smoothly. Furthermore, it is not necessary to force to enter the fingertip part 30 into a position between liquid crystal display part 64 and the high capacity battery pack 40. Hence, it is possible to prevent a nail of the fingertip part 30 from being harmed.

If a similar hollow part with the hollow part 51 is situated on a part of the upper surface 45 of the housing 41 in the X1-X2 direction, it may be necessary for the operator to seek and put the fingertip part 30 the similar hollow part consciously. However, in this embodiment, the hollow part 51 has a full length of the housing 41 in the X1-X2 direction. Therefore, in this embodiment, it is not necessary for the operator to

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seek a position of the hollow part 51 consciously. The operator, in this embodiment, can find the hollow part 51 easily by reaching out the fingertip part 30 to a convenient position to operate the front end part 70 of the liquid crystal display part 64 in the X1-X2 direction. That is, in this embodiment, there is no limitation of a position where the fingertip part 30 is put. Hence, it is possible for the operator to operate to open the liquid crystal display part 64 smoothly.

In addition, the operator can smoothly operate to detach the high capacity battery pack 40 from the portable personal computer 60. That is, after the operator operates a lock off button not shown in FIG. 5 which is situated at the lower surface of the high capacity battery pack 40, the fingertip part 30 enters into the hollow parts 51 and 52 and the second battery line housing part 50 is grasped and pulled in the Y2 direction by hand of the operator, as shown in FIG. 5. As a result, the high capacity battery pack 40 can be detached from the portable personal computer 60 easily. Therefore, it may be avoided to fall down the high capacity battery pack 40 when the high capacity battery pack 40 is detached from the portable personal computer 60.

The present invention is not limited to these embodiments, but variations and modifications may be made without departing from the scope of the present invention. For instance, the battery pack of the present invention is not limited to the pack for the battery having a higher capacity than the standard battery pack. The present invention is able to be applied to a battery pack having a configuration in which an overhanging part overhangs from the body part to the front end side when the battery pack is connected to the battery pack

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connecting part of the body part.

In addition, the present invention is not limited to be applied to the battery pack of the above described embodiment where the plural battery  
5 having the column configurations are housed. A concrete structure of an inside of the battery pack is not limited to a structure described above.

This patent application is based on Japanese priority patent application No. 2001-283800  
10 filed on September 18, 2001, the entire contents of which are hereby incorporated by reference.

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